

Demonstration of Plasma Assisted Waste Conversion to Gas

Completed Technology Project (2017 - 2019)



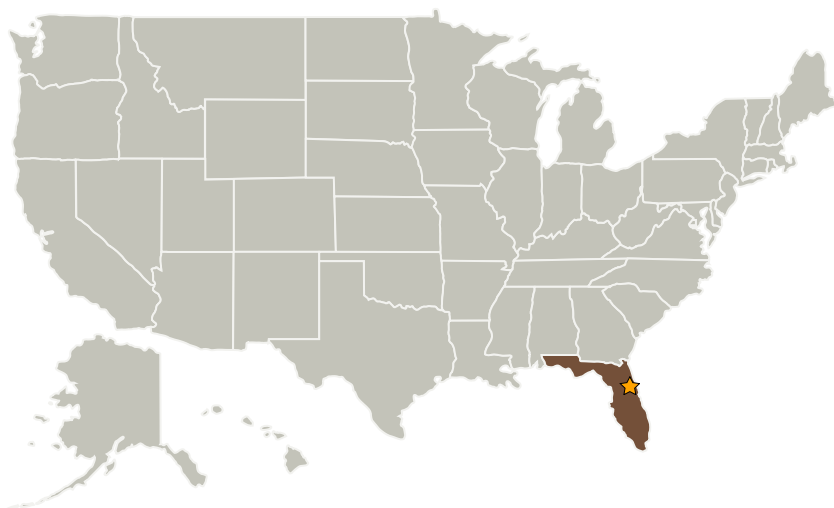
Project Introduction

The goal is to demonstrate high fidelity mission waste simulant conversion with a proprietary DC plasma torch, a different approach from industry which uses higher powers not acceptable on the smaller scale of space missions. The baseline carrier gas will be 100% air, then the feasibility of alternate carrier gases (CO₂, N₂, and hydrocarbon product gas recirculation) will be evaluated. A CO₂ carrier gas is ideal since it is a byproduct of human metabolic activity (available on ISS), and 95% of the Mars atmosphere. A semi-closed loop system could be achieved if the product gases produced by the trash conversion itself could be used as a carrier gas. As this technology advances it would eventually be infused into future AES projects. The next steps would be to demonstrate up to three down-selected technologies in the combustion integration rack for microgravity experiments on board the ISS, and then build a flight unit for converting mission waste into gas to reduce volume, odor, and provide sterilization of waste.

Anticipated Benefits

Demonstrate plasma assisted waste conversion to gas as a possible down-select technology for waste processing on board space vehicles and space habitats for long duration missions. Reducing waste to an inert gas for venting, or repurposing, is a necessary means of maintaining human presence on any extraterrestrial land mass, cislunar station, or long-duration mission. NASA does not currently have a determined mature waste conversion system (or down selected technology) for future long duration or habitat missions

Primary U.S. Work Locations and Key Partners

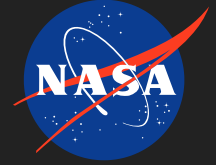


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Organizations Performing Work	Role	Type	Location
★ Kennedy Space Center (KSC)	Lead Organization	NASA Center	Kennedy Space Center, Florida
Applied Plasma Technologies, Corp.	Supporting Organization	Industry Women-Owned Small Business (WOSB)	

Primary U.S. Work Locations

Florida

Project Website:

<https://www.nasa.gov/directorates/spacetech/home/index.html>

Organizational Responsibility

Responsible Mission Directorate:

Space Technology Mission Directorate (STMD)

Lead Center / Facility:

Kennedy Space Center (KSC)

Responsible Program:

Center Innovation Fund: KSC CIF

Project Management

Program Director:

Michael R Lapointe

Program Manager:

Barbara L Brown

Principal Investigator:

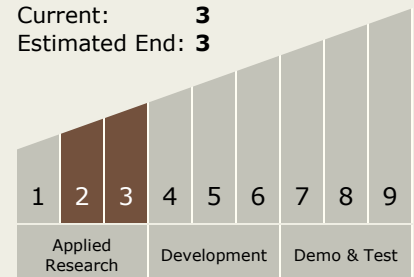
Anne J Meier

Technology Maturity (TRL)

Start: 2

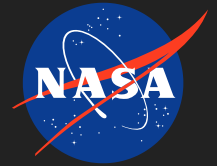
Current: 3

Estimated End: 3



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Technology Areas

Primary:

- TX07 Exploration Destination Systems
 - └ TX07.2 Mission Infrastructure, Sustainability, and Supportability
 - └ TX07.2.1 Logistics Management

Target Destinations

Earth, Mars, Outside the Solar System